



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Heating networks [N2EPiO1-ECiO>SC]

### Course

Field of study

Industrial and Renewable Energy Systems

Year/Semester

1/1

Area of study (specialization)

Thermal and Renewable Energy

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

### Number of hours

Lecture

9

Laboratory classes

0

Other

0

Tutorials

9

Projects/seminars

0

### Number of credit points

2,00

### Coordinators

dr inż. Łukasz Semkło

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### Lecturers

dr inż. Łukasz Semkło

lukasz.semklo@put.poznan.pl

### Prerequisites

Has knowledge of the latest design of machinery and equipment used in industry energy. Is able to formulate and test hypotheses related to simple research problems. He is ready to fulfill social obligations, inspire and organize activities for the social environment.

### Course objective

Introduction to issues of thermal installations, transmission of fluids with elevated temperature in pipelines. Mastering specialized vocabulary.

### Course-related learning outcomes

Knowledge:

1. has knowledge of the latest machinery and equipment constructions used in heating networks [p7s\_wk, ec2a\_w04]
2. knows and understands the fundamental aspects related to the design, construction, implementation and maintenance of systems and equipment included in the thermal networks [p7s\_wk, ec2a\_w08]
3. knows legal issues related to the design and use of heating networks [p7s\_wk, ec2\_w12]

#### Skills:

1. can formulate and test hypotheses related to simple research problems occurring in heating networks [p7s\_uk, e2a\_u05]
2. is able to use the experience gained in the environment, dealing professionally with medium transmission using heating networks, experience related to the maintenance of equipment, facilities and systems [p7s\_uk, e2a\_u14]
3. is able to communicate on topics related to medium transmission, using heating networks, with diverse circles of recipients [p7s\_uk, e2a\_u15]

#### Social competences:

1. is ready to fulfill social obligations and protect the social environment at the time of designing the heat networks [p7s\_ko, e2a\_k03]
2. is ready to initiate social interest activities regarding heating networks [p7s\_ko, e2a\_k04]
3. by undertaking work in the design or operation of heating networks, he is ready to perform responsible professional roles, taking into account changing social needs, including:
  - developing professional achievements,
  - maintaining the ethos of the profession,
  - compliance with and development of the rules of professional ethics and actions to comply with these principles "[p7s\_ko, e2a\_k06]

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture - written exam. Obtaining credit from a minimum of 51% of the points possible to get. There is a possibility of an oral question to raise the grade.

Project - in order to complete the project, the lecturer should complete the project and answer the questions asked for the project.

### Programme content

Construction and components of heating networks. Management analyzes of different areas of operated heating networks. Discussion on elements of different systems: heat transfer and oasis enterprises. Security of thermal installations, people and enterprises, minimizing the effects of aging of networks, machines and fittings. Methodology for calculating heating networks. The lecture will be conducted using a multimedia presentation. Classes will be conducted at the blackboard (chalk or white), the student is required to have a calculator.

### Course topics

Construction and components of heating networks. Management analyzes of different areas of operated heating networks. Discussion on elements of different systems: heat transfer and oasis enterprises. Security of thermal installations, people and enterprises, minimizing the effects of aging of networks, machines and fittings. Methodology for calculating heating networks. The lecture will be conducted using a multimedia presentation. Classes will be conducted at the blackboard (chalk or white), the student is required to have a calculator.

### Teaching methods

Informative (conventional) lecture (transfer of information in a systematic way) - can be of course (propedeutical) or monographic (specialist)

Problem lecture ("internal dialogue" of the lecturer with the student: understanding the problem, gathering premises, solving it)

Conversational lecture ("external dialogue" of the lecturer with the student; students participate in solving the problem) - the continuation of the lecture may be a seminar

Exercise method (subject exercises, exercises) - in the form of auditorium exercises (the application of acquired knowledge in practice - it can take a different nature: solving cognitive tasks or training psychomotor skills; transforming conscious activity into a habit through repetition)

### Bibliography

#### Basic

1. Witold Szuman: Elektrociepłownie i sieci ciepłne, Państwowe Wydawnictwo Naukowe, 1963.

2. Dembińska-Cyran I., Gubała M.: Podstawy zarządzania transportem w przykładach. Wydawnictwo Instytut Logistyki i Magazynowania. Poznań 2005

3. Krystyna Krygier: Sieci ciepłownicze : materiały pomocnicze do ćwiczeń, Oficyna Wydawnicza PW, 1995

#### Additional

1. Trade magazines

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,00
Classes requiring direct contact with the teacher	20	0,70
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	1,30